

## Remarks

### Rejections Under 35 USC §102 and 35 USC §103

Claims 1, 3-6, 8, 10-17, 19, 22-25 and 27-32 have been rejected under 35 USC §102(b) as being anticipated by the document "Fuzzy and Probabilistic Control Techniques Applied To Problems of the Chemical Process Industries" dated July 2001.

Claims 1, 3-5, 12-17, 19, 22-25 and 27-32 have been rejected under 35 USC §103(a) as being unpatentable over the article "A Fuzzy Controlled Three-Phase Centrifuge for Waste Separation" dated May 1998, in view of Giebeler et al. (US Patent No. 4,700,117), Elgersma et al. (US Patent No. 5,561,993), or Evans III et al. (US Patent No. 6,635,007).

Claims 1, 3-5, 12-17, 19, 22-25 and 27-32 have been rejected under 35 USC §103(a) as being unpatentable over the article "A Fuzzy Control System for a Three-Phase Oil Field Centrifuge" dated August 1998, in view of Giebeler et al. (US Patent No. 4,700,117), Elgersma et al. (US Patent No. 5,561,993), or Evans III et al. (US Patent No. 6,635,007).

Claims 20-21 and 33-34 have been rejected under 35 USC §103(a) as being unpatentable over the article "A Fuzzy Controlled Three-Phase Centrifuge for Waste Separation" dated May 1998 in view of Giebeler et al. (US Patent No. 4,700,117), Elgersma et al. (US Patent No. 5,561,993), or Evans III et al. (US Patent No. 6,635,007) as applied to claims 15 and 29 above and further in view of Davis (US Patent No. 5,499,586).

Claims 20-21 and 33-34 have been rejected under 35 USC §103(a) as being unpatentable over the document "Fuzzy and Probabilistic Control Techniques Applied to Problems of the Chemical Process Industries" dated July 2001 in view of Davis (US Patent No. 5,499,586).

The rejections under 35 USC §102 and 35 USC §103 are traversed for the reasons to follow.

#### 35 USC §102(b) Rejections Over July 2001 Document

The 35 USC §102(b) rejections are traversed as the claimed invention was reduced to practice in the United States prior to the effective date of the July 2001 document "Fuzzy and Probabilistic Control Techniques Applied To Problems of the Chemical Process Industries". Attached to this Amendment is an Affidavit under 37 CFR §1.131. The Affidavit demonstrates actual reduction to practice of the claimed invention in the United States prior to July 2001.

The Affidavit includes Exhibit A, pages 24-29 of the July 2001 document, which state that the thesis was based on the actual reduction to practice of the invention. The Affidavit also includes Exhibit B, parent application serial no. 09/357,339 filed 07/14/1999. The parent application discloses a "system for separating a multi phase mixture" that includes a centrifuge and an original control system incorporating fuzzy logic rules.

The present application discloses an advanced control system having elements not disclosed in the parent application. Specifically, the advanced control system incorporates a feed forward control system configured to sense feed variables of the mixture into the centrifuge, and a feed forward controller configured to adjust a feed temperature and a feed rate of the mixture based on the

feed variables and a set of fuzzy logic rules. The advanced control system also includes a feedback control system configured to measure feedback variables in the liquid phase components, and a feed back controller configured to adjust the feed temperature and the feed rate based on the feedback variables and the set of fuzzy logic rules. The feedback controller also includes a conflict resolution portion configured to coordinate the operation of the feed forward controller and the feedback controller.

The parent application disclosed a centrifuge system having a feedback control system (page 10, lines 7-10 of the specification of the parent application-Exhibit B). A centrifuge system with a feed forward control system and a feed back control system in combination, are not disclosed in the parent application. However, the presently claimed system with these elements was reduced to practice and tested in the United States prior to July 2001.

The Affidavit includes Exhibit C consisting of notes from the lab notebook of co-inventor William J. Parkinson. These notes were written between 7/27/99 and 8/17/99, and include fuzzy logic rules for the advanced control system.

The Affidavit also includes Exhibits D-I, which are quarterly reports prepared by co-inventor William J. Parkinson for John Ford of the National Petroleum Technology Office of the Department of Energy. These unpublished reports chronicle the design, building and testing of the claimed system with the advanced control system. It is submitted that Exhibit D-I prove actual reduction to practice of the system with the advanced control system in the United States prior to July 2001.

Under the case law, actual reduction to practice requires that an inventor: (1) constructs a product or

performs a process that is within the scope of the patent claims, (Newkirk v. Lulejian, 825 F.2d, 1581, 1582, 3 USPQ2d 1793, 1794 (Fed. Cir. 1987)) and (2) demonstrates the capacity of the inventive idea to achieve its intended purpose (Scott v. Finney, 34 F.3d 1058, 1061, 32 USPQ2d 1115, 1117 (Fed. Cir. 1994)).

Exhibit I which is for first quarter of FY01 (October-December of 2000) states on page 2, first paragraph: "We have had some bad luck in testing our control system, but we have accomplished quite a bit in building it." (emphasis added) This statement taken in context with the other quarterly reports demonstrates actual reduction to practice of the invention (i.e., construction and testing) at least by the first quarter of FY01 (i.e., December of 2000).

35 USC §103 Rejections Over May 1998 Article "A Fuzzy Controlled Three-Phase Centrifuge For Waste Separation" and August 1998 Article "A Fuzzy Control System For A Three-Phase Oil Field Centrifuge"

All of the 35 USC §103 rejections are based on the above co-inventor authored articles published in 1998. However, neither of these references discloses or suggests the present control system having feed forward and feed back elements in combination. The secondary references also do not disclose these elements. In this regard, Giebeler et al., Elgersma et al. and Evans, III et al. were cited as disclosing centrifuge control systems with filtering elements, and Davis was cited as disclosing a vapor recovery system. The cited combination of references therefore does not teach or suggest all the claim limitations, as required by MPEP 2142, 2143 to support obviousness rejections under 35 USC §103(a).

Both of the co-inventor articles disclose a feedback system wherein feedback variables in the product oil and

the product water are sensed. This is the original control system disclosed in the parent application. However, the present control system also senses feed forward variables of the mixture into the centrifuge. In addition, the present system resolves conflicts prior to adjusting the feed rate and the feed temperature of the mixture based on the feedback variables and the feed forward variables.

As demonstrated by the Affidavit, the design, building and testing of the presently claimed advanced control system required many hours of work by the co-inventors subsequent to the articles published in 1998. Co-inventor Neal Miller has years of experience in operating centrifuges and separating multi phase mixtures. Co-inventors William J. Parkinson and Ronald E. Smith are well educated scientist from the prestigious Los Alamos National Laboratory. If the advanced control system were obvious over the articles published in 1998, then it wouldn't have taken this group of skilled artisans so much time and effort to develop. Government sponsored scientists are encouraged to publish, but in this case are being denied patent rights for articles published prior to actual development of the invention.

Applicant would further argue that the 1998 articles are non enabling as to the original control system, and to the presently claimed advanced control system as well. In this regard, the August 1998 article states at paragraph 3: "The rules and membership functions shown here are similar to the ones that were obtained from the expert, but actual values are fictitious in order to protect confidential information." The May 1998 article has a similar statement on page 3 under the heading "Fuzzy Control System".

The actual rules would not be obvious to one skilled in the art reading the 1998 articles, as they were developed using more than just routine experimentation. In particular, co-inventor Neal Miller had the years of experience necessary to efficiently operate a centrifuge in

all types of condition. However, this experience had to be extracted from Neal's head, expressed as a set of rules, and then incorporated into a functioning control system. As stated in the May 1998 article: "A major problem is that only the inventor can set up and run the equipment well enough to provide an optimal clean up". As stated in the August 1998 article: "Fuzzy rules and membership functions were obtained in the field, working with the operator at several different sites".

It is thus submitted that the actual rules are unobvious over the fictitious rules published in the 1998 articles. It is further submitted that without the actual rules, the 1998 articles do not enable the original control system, or the advanced control system, to those skilled in the art.

As held in In re David C. Paulsen, 30 F.3d 1475, 31 USPQ 2d (BNA) 1671, (U.S. App 1994): "A proper 35 USC §102 rejection requires that each and every limitation of the claimed invention be disclosed in a single prior art reference. In addition, the reference must be enabling and describe the applicant's claimed invention sufficiently to have placed it in possession of a person of ordinary skill in the field of the invention."

Although the present rejections are under 35 USC §103, the above holding is believed to be applicable, as the 1998 articles, even in combination with the secondary references, do not place the present invention in the possession of one skilled in the art. In this regard, if the 1998 articles were patent applications, they would certainly have 35 USC §112 issues.

All of the independent claims include limitations which patentably distinguish the claimed system and method from the prior art. Specifically, all of the independent claims recite feed forward features, wherein variables of the mixture into the centrifuge are sensed and used to control the centrifuge. In addition, all of the

independent claims, except claims 12 and 29, recite the feed forward features in combination with feedback features, wherein parameters of the liquid phase components are also measured, and used to control the centrifuge. However, independent claims 12 and 29 recite feed forward features in combination with noise filtering features.

Independent claim 1 recites "the control system configured to sense feed variables of the mixture into the centrifuge and at least one parameter of the first liquid phase component or the second liquid phase component and to adjust a feed temperature and a feed rate of the mixture based on the variables, the parameter and the set of fuzzy logic rules" (i.e., feed forward and feedback in combination).

Independent claim 6 recites "a feed forward control system" and "a feedback control system" having "a conflict resolution portion" (i.e., feed forward and feedback in combination).

Independent claim 12 recites "a feed forward control system" in combination with a noise "filter" (i.e., feed forward and filtering in combination).

Independent claim 15 recites "a fuzzy soft sensor in signal communication with a first sensor configured to sense a feed temperature (T1) of the mixture" (i.e., feed forward) and "a second sensor configured to sense a basic solids and water content of the mixture" (i.e., feedback).

Independent claim 23 recites the step of "sensing at least one feed variable of the mixture and at least one parameter of the first liquid phase component or the second liquid phase component" (i.e., feed forward and feedback in combination).

Independent claim 29 recites the step of "sensing the basic solids and water content of the mixture and the cold feed temperature" (i.e., feed forward), and the step of "filtering signals representative of the basic solids and


water content and the cold feed temperature from noise"  
(i.e., filtering).

Conclusion

In view of the above amendments, arguments and Affidavit, favorable consideration and allowance of claims 1, 3-6, 8, 10-17, 19-25 and 27-34 is requested. Should any issues arise that will advance this case to allowance, the Examiner is asked to contact the undersigned by telephone.

DATED this 10th day of September, 2004.

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